



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/797,188

03/11/2004

Taiji Ema

960045E

4959

38834

7590

07/17/2009

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

DAHIMENE, MAHMOUD

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

07/17/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/797,188	Applicant(s) EMA ET AL.	
	Examiner MAHMOUD DAHIMENE	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3,19 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,19 and 23-28 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 2 and all dependent claims are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The examiner could not find the term "plug" in applicant's specification, there is not support, in applicant's specification for the newly added limitation of "forming a conductive material in the hole to form a conductive plug of the conductive material" and the limitation of "forming over the third insulation film an interconnection pattern connected to the conductive plug;". Also the only reference, in applicant's specification to "a fifth insulator" is found in page 30 of the specification, citing "contact holes opened on the second through-holes; a second sidewall insulation film forming step of depositing a **fifth insulation film on the fourth** insulation film", however, claim 1, as amendment, requires the fifth film to be over the interconnection pattern which is above the fourth film, in the specification the fifth insulation film is on the fourth insulation film, not over the interconnection pattern. Since the drawings supplied by the applicant exceed 59 pages and the term "plug" is not even used in applicant's specifications, it is very hard, or near impossible, for the

Art Unit: 1792

examiner to guess which figure, out of the over 60 figures, might contain support for the above amendments in the drawings.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 2, 19, 23—27 are rejected under 35 U.S.C. 102(e) as being anticipated by Dennison et al. (US 5,338,700).

Dennison discloses a method for forming a bit line over capacitor array of memory cells, the method comprises:

Art Unit: 1792

forming a conductor pattern (12), (14), (16), (26) over a semiconductor substrate (figures 3-4), active region 26 defines a first active region for electrical connection (conductive) with a memory cell capacitor;

forming a first BPSG insulation film (28) covering the conductor pattern and having a substantially fiat surface (30);

forming over the first insulation film a second insulation film (50) (Oxide + nitride) having etching characteristics different from those of the first insulation film citing "Such would typically be conducted by photomasking and dry chemical etching of BPSG selective to nitride. An example etch chemistry would include CHF.sub.3 and O.sub.2 at low O.sub.2 flow rate (i.e., less than 5% O.sub.2 by volume in a CHF.sub.3 /O.sub.2 mixture), or the combination of CF.sub.4, AR, CH.sub.2 F.sub.2 and CHF.sub.3.

Thereafter, a blanket etch of the wafer is conducted to etch nitride layer 20 selectively to silicon to upwardly expose active area 24. An example etch chemistry would include a combination of CHF.sub.3 and CF.sub.4. The principle purpose of barrier layer 20 is to prevent diffusion of boron or phosphorous atoms from BPSG layer 28 into active areas 24 and 26. Caps 18 are preferably comprised of nitride (Si.sub.3 N.sub.4) where layer 28 is comprised of oxide, such that the contact etch to produce first contacts 32 will stop relative to word lines spacers and caps 18." (column 3, line 60) ;

forming over the second insulation film a third insulation film (52) (BPSG) having etching characteristics different from those of the second insulation film (50);

Art Unit: 1792

forming over the third insulation film a mask layer (Dennison broadly discloses etching of openings typically is conducted by photomasking and dry chemical etching of BPSG selective to nitride (column 3, line 63) which is applicable here as well); and

forming a hole in the third insulation film, the second insulation film and the first insulation film, the step of forming the hole including a first step of etching the third insulation film, a second step of etching the second insulation film and a third step of etching the first insulation film, an etching condition at the first step being different from that at the second step since Dennison uses a different etching chemistry to etch each type of layer, and further comprising:

before the step of forming the first insulation film(28), the step of forming over the conductor pattern a fourth insulation film (20) (nitride) having etching characteristics different from those of the first BPSG insulation film, and wherein

in the step of forming the first insulation film, the first insulation film is formed over the fourth insulation film so as to cover the conductor pattern, and

in the third step of etching the first insulation film, the first insulation film is etched with the fourth insulation film as a stopper, Dennison clearly suggests etch selectivity

between BPSG and silicon nitride (column 3, line 60) which means when the BPSG (28)

is etched, a new etch step needs to be initiated in order to remove the nitride (20),

therefor nitride (20) acts as an etch stop layer for the BPSG (28) etch step. It is noted

that Dennison does not expressly call (20) an etch stop layer, however, according to

Dennison's description, the examiner interprets layer (20) to be an etch stop layer since

the BPSG (28) etch step is stopped before etching layer (20).

Art Unit: 1792

According to (fig. 10) of Dennison conductive material (70) is formed in the etched hole. Since applicant does not define the term “plug” in the specification, the examiner interprets the term “plug” as encompassing any material that partially fills a hole (plugging the hole) which material (70) does. Material (70) is formed over the third insulation film and forms an interconnection pattern connected to the conductive plug, Dennison cites “A conductive capacitor cell layer 70 is provided atop capacitor cell dielectric layer 68, thus **defining an array of memory cell capacitors 72 on the wafer.**” (column 5, line 40). A fifth insulation film ((78) is formed over the interconnected capacitor array (70).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

Art Unit: 1792

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Rejections - 35 USC § 103

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dennison et al. (US 5,338,700) as applied to claim 2 above in view of S. Wolf and R.N. Tauber, (Silicon Processing for the VLSI Era, Volume 1- Process Technology, Lattice Press, 1986) (pp. 526-528).

It is noted that Dennison et al. (US 5,338,700) is silent about the etching steps selectivity as described in applicant's claim 28, however, Wolf teaches that controlling etch selectivity when more than one material is exposed to the etching condition is well known in the art of etching (page 528).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Dennison to select the proper etch selectivity including the etch selectivity as described in applicant's claim 28 because Wolf teaches that controlling etch selectivity when more than one material is exposed to the etching condition is well known in the art of etching.

One of ordinary skill in the art would have been motivated to modify the process of Dennison to select the proper etch selectivity including the etch selectivity as described in applicant's claim 28 in order to obtain the desired etch profile/anisotropy through control of etch selectivity as suggested by Wolf.

Claim Objections/Allowable Subject Matter

6. Claims 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 3, the cited prior art of record fail to disclose or suggest a method of fabricating a semiconductor device including a step wherein a fourth insulation film is selectively formed over a side wall of a conductive pattern, in combination of all the limitations of claim 2 and claim 3.

Response to Arguments

Applicant's arguments filed 4/7/2009 have been fully considered.

Rejection of claim 3 under 35 U.S.C. 112, first paragraph is withdrawn in view of applicant's remarks showing support for the amendments.

Rejection of claim 3 under 35 U.S.C. 112, second paragraph is withdrawn in view of applicant's amendment to the claim.

Rejection of claim 28 under 35 U.S.C. 112, second paragraph is withdrawn in view of applicant's amendment to the claim.

As to applicant's arguments about claim 2, they are not persuasive because as explained in the instant office action the reference of Dennison appears to include all the limitations of applicant's claim 2.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MAHMOUD DAHIMENE whose telephone number is (571)272-2410. The examiner can normally be reached on week days from 8:00 AM. to 5:00 PM..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. D./
Examiner, Art Unit 1792

/Shamim Ahmed/
Primary Examiner, Art Unit 1792